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PRE-APPEAL BRIEF REQUEST FOR REVIEW		Docket Number: 14624-004001
	Application Number 10/763,390	Filed January 26, 2004
	First Named Inventor Holger Schlueter et al.	
	Art Unit 2828	Examiner Tod Thomas Van Roy

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a Notice of Appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☒ attorney or agent of record 45,653
(Reg. No.)

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34

/Diana DiBerardino/
Signature

Diana DiBerardino
Typed or printed name

(617) 542-5070
Telephone number

July 7, 2008
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below'.

☒ Total of 1 form is submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Holger Schlueter et al.	Art Unit	: 2828
Serial No.	: 10/763,390	Examiner	: Tod Thomas Van Roy
Filed	: January 26, 2004	Conf. No.	: 4590
Title	: FIBER LASER		

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF

Pursuant to United States Patent and Trademark Office OG Notices: 12 July 2005 – New Pre-Appeal Brief Conference Pilot Program, a request for a review of identified matters on appeal is transmitted with the Notice of Appeal. Review of these identified matters by a panel of Examiners is requested because the rejections of record are not proper and are without basis in view of a clear legal or factual deficiency in the rejections. All rights to address additional matters on appeal in any subsequent appeal brief are reserved.

Claims 1, 4-9, 11-28, and 30-33 are pending, with claims 1 and 30 being independent. Claims 1, 4-6, 8, 9, 11, 25-28, and 30 have been rejected as being anticipated by U.S. Patent No. 5,027,079 (Desurvire). Claim 7 has been rejected as being unpatentable over Desurvire in view of U.S. Patent No. 6,970,631 (Arbore). Claims 12-14 and 18 have been rejected as being unpatentable over Desurvire in view of U.S. Patent No. 6,954,575 (Fermann). Claims 11, 13, 15-17, and 31-33 have been rejected as being unpatentable over Desurvire in view of U.S. Patent No. 6,445,838 (Caracci). Claims 19 and 20 have been rejected as being unpatentable over Desurvire in view of U.S. Patent No. 5,774,484 (Wyatt). Claims 21-24 have been rejected as being unpatentable over Desurvire in view of U.S. Publication No. 2002/0018287 (Zellmer). Applicant requests withdrawal of these rejections.

Applicant specifically asks the panel to review the issues highlighted below, and notes that all of the remaining rejections under Sections 102 and 103 should be reversed based on a proper interpretation of the Desurvire primary reference.

Desurvire does not describe or even suggest an active region having a sufficiently small transverse dimension such that less than about 10% of the radiation produced at the characteristic wavelength in the active region is confined to the active region and such that the optical fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold, as recited in claim 1 and as similarly recited in claim 30.

Desurvire relates to a single mode erbium-doped fiber amplifier having a core surrounded by a cladding. See Desurvire at col. 2, lines 10-22, and Fig. 3. Desurvire shows the pump mode 54 and its relation to the core and explains that erbium atoms 56, 58, 60 positioned near the edge of the core are not excited, because they are not exposed to enough pump intensity. See Desurvire at col. 5, lines 18-66, and Fig. 3. Therefore, Desurvire strives to adjust parameters of the erbium-doped fiber amplifier to obtain optimum gain performance so that more erbium in the core is exposed to pump intensity. See Desurvire at col. 5, line 66, to col. 6, line 8.

However, Desurvire never describes or suggests that the core has a sufficiently small transverse dimension such that less than about 10% of the radiation produced at a characteristic wavelength in the core is confined to the core and such that the fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold.

Applicant's invention lies in the realization that by reducing the size of the active medium, and the overlap of the lasing mode (the signal mode) with the active medium within the fiber, the gain is reduced to a value slightly above the threshold for the lowest-order mode to prevent multimode operation of the laser. See the specification at page 6, line 1 to page 7, line 10. Desurvire never suggests that the core could be made so small as to cut off even the lowest-order Gaussian mode such that even the signal mode would not be confined to the core. To the contrary, Desurvire's fibers are design such that the signal mode is confined to the core, as discussed above. As applicant explains, because the beam in applicant's optical fiber is not confined to the active region, the beam can have a spatial profile that is defined by the dimensions of the multi-mode fiber core, which typically are much larger than the dimensions of a single-mode fiber core. The increased beam profile allows the fiber laser to produce multi-kW

output powers without increasing the intensity within the fiber to a level at which non-linear effects occur appreciably. See the specification at page 6, lines 21-25.

The Examiner points to Table 1 of Desurvire to show that the signal power mode size of the fundamental mode is 4.09 μm (see Office Action, at page 4). Applicant thanks the Examiner for pointing to Table 1, which supports applicant's contention that Desurvire's core has a dimension that 'is not sufficiently small such that less than about 10% of the radiation produced at a characteristic wavelength in the core is confined to the core and such that the fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold. In Table 1, the size of the core of the TYPE A fiber is given by the core radius "a" and the core radius "a" is listed as being 4.5 μm. The value that the Examiner points to (4.09 μm) is the signal power size ω_s^{01} of the LP_{01} mode. Thus, it is clear that the signal power size (4.09 μm) is less than the core (having a size of 4.5 μm) of the TYPE A fiber. Therefore, in the TYPE A fiber, the core cannot be said to be sufficiently small such that less than about 10% of the radiation produced in the LP_{01} mode is confined to the core. Indeed, as Desurvire specifically shows in Table 1, the core size is large enough so that all of the radiation produced in the LP_{01} mode is confined to the core. Moreover, the TYPE B and TYPE C fibers have the same relationship between the core size and the signal power size in that the signal power size is confined to the core.

The Examiner then points to Fig. 11 of Desurvire and argues that Fig. 11 indicates that the confinement parameter epsilon can be decreased to zero while increasing the gain coefficient. Applicant agrees that Desurvire defines the confinement parameter epsilon as the ratio of the erbium doped core radius to the fiber radius. However, epsilon can be zero only if either the erbium doped core radius is zero or the fiber radius is infinite. Desurvire suggests neither of these options. Indeed, Desurvire even points out that a confinement factor that approaches zero has no physical meaning. See Desurvire at col. 9, lines 53-55 ("Note that the case $\epsilon \rightarrow 0$ is a mathematical limit and has no physical meaning...."). Rather, Desurvire suggests that the erbium doped core radius can be adjusted relative to the fiber radius to produce a confinement parameter as small as 0.25. And, Desurvire only suggests this confinement parameter for the TYPE A, B, and C fibers detailed in Table 1. See Desurvire at Fig. 11, which provides the

curves only for the fibers of TYPE A, B, and C. In addition, as discussed above, all of the TYPE A, B, and C fibers discussed in Table 1 are designed to confine the signal power to the core radius and cannot be said to have a core transverse dimension such that less than about 10% of the radiation produced at a characteristic wavelength in the core is confined to the core and such that the fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold.

Moreover, with respect to the rejections under Section 103, one of ordinary skill in the art would not have been motivated to modify Desurvire to provide for confinement, where the optical fiber has a gain along its longitudinal direction that is sufficiently small so that a desired laser mode operates above a lasing threshold while all other modes operate below the lasing threshold, because Desurvire teaches away from such a configuration and suggests that the gain should instead be increased. See Desurvire at col. 9, line 63, to col. 10, line 32, which explains that the gain has to be maximized by increasing the length as the confinement parameter is decreased.

For at least these reasons, the rejection of claims 1 and 30 should be withdrawn.

Claims 4-6, 8, 9, 11, and 25-28 depend from claim 1 and are allowable for at least the reasons that claim 1 is allowable and for containing allowable subject matter in their own right. For example, claims 4 and 5 recite, respectively, that less than about 5% and 2% of the radiation produced at the characteristic wavelength in the active region is confined in the active region. Desurvire does not describe or suggest such confinement. Rather, as discussed above, all of the fibers described in Desurvire (TYPES A, B, and C) have signal power sizes (ω_s^{01}) that are less than the core radius a. See Desurvire at Table 1. Accordingly, in Desurvire, about 100% of the radiation produced at the characteristic wavelength in the core is confined in the core.

The secondary references do not remedy the above-noted failures of Desurvire.

In Arbore, the core 12 is not configured such that less than about 10% of the radiation produced in the core 12 is confined to the core. Rather, as the Examiner concedes and as is suggested by Fig. 1 of Arbore, substantially more radiation is confined to the core 12 in Arbore's

configuration. In Fermann, the optical fiber includes the core and the cladding around the core (as shown at Figs. 1 and 4A-7C of Fermann), but there is no description or suggestion in Fermann that less than about 10% of the radiation produced in the core is confined in the core. Similarly, Caracci's optical component includes optical fibers 281, 282 (see Caracci at col. 4, lines 46-56 and Fig. 1), but there is no description or suggestion in Caracci that less than about 10% of the radiation produced in a core of the fibers 281, 282 is confined in the core. Wyatt's multimode fiber 1 (see Wyatt at col. 5, lines 15-32 and Fig. 1) is not configured such that less than about 10% of the radiation produced in a core of the fiber 1 is confined in the core. Lastly, there is also no description or suggestion in Zellmer that less than about 10% of the radiation produced in a core of the amplifier fiber 12 is confined in the core.

Furthermore, each of the proposed combinations of secondary references with Desurvire must be considered in light of Desurvire's teachings that would have lead the ordinarily skilled artisan away from, rather than toward, the subject matter of the claims because the references all strive to increase gain and to confine the radiation produced in the active region rather than having an active region having a sufficiently small transverse dimension such that less than about 10% of the radiation is confined to the active region, as presently claimed.

For these reasons, applicant submits that the final rejection should be reversed.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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/Diana DiBerardino/
Diana DiBerardino
Reg. No. 45,653

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331